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A New Energy

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A new energy

Electrical Power Affiliates Program empowers engineering faculty, students

As the world's population increases and the demand on our power grids grows, how will we keep the lights on?

That's where Kansas State University fits in. Through the Electrical Power Affiliates Program, or EPAP, the College of Engineering is leading the charge in solving future problems for the power and energy industry.

The program, housed in the electrical and computer engineering department, partners with eight industry organizations. Since its establishment in 2008, EPAP has supported relevant research projects and provided engineering students with real-world experience, said Noel Schulz, program director and the College of Engineering's associate dean for research and graduate programs.

"Interaction with industry is a key component of our goal to become a Top 50 public research university by 2025," said



Schulz, who also is the university's first lady. "Many of the research projects funded by EPAP are in line with industry issues. By interacting with corporate partners, we can get a better understanding of what industry challenges might appear in the next five to 10 years. We can make sure our faculty and staff know what challenges might happen tomorrow and in the future so they can help solve those problems."

Faculty and student research

A key component of EPAP is providing support for faculty and student research projects on numerous relevant topics: wind power, smart grids and electric vehicles.

For the past three years, the program has given more than \$110,000 each year to support small projects for undergraduates and graduate students. During that time, 18 faculty and staff from seven departments and Engineering Extension have received more than \$300,000 in support for their activities.

"Funding from EPAP can support researchers in getting preliminary data and that makes them more competitive for larger external funding," Schulz said. "Researchers are able to use it as a steppingstone for larger projects on the federal landscape."

Behrooz Mirafzal, assistant professor of electrical and computer engineering, used the Electrical Power Affiliates Program funding and other funding sources to develop a new research power electronics laboratory. Because of this preliminary research, Mirafzal was able to apply and receive a \$400,000 National Science Foundation CAREER award to help develop grid interactive converters for the next generation of power grids.

"Programs like the Electrical Power Affiliates Program support the faculty members who are active in power and energy areas to run small projects and obtain preliminary results, which are typically required for preparing large grants," Mirafzal said.

Here's a look at some of the research projects funded for the 2014-2015 academic year:

- Wind turbines and grid interaction.
- Secure and reliable openflow networks for smart grids.
- Understanding condensation mechanisms and coating wear.
- Constructed wetland treatment systems and the treatment of flue gas desulfurization effluents.
- Electric vehicle charging.

Real-world experiences

The Electrical Power Affiliates Program is key to the university's — and the state of Kansas' — goal of providing more engineers, Schulz said.

The program gives engineering students the opportunity to research, learn, network and engage in professional development. In 2014, 22 students attended a Chicago conference, presented posters and papers, and interacted with industry members.

Additionally, EPAP sponsors EPAP Day every fall semester. The annual event includes a mini career fair, mock interviews for students, lunch, research poster sessions and opportunities for students to network with power and electric companies.

"Through EPAP and the partnership between industry and academics, we are able to give our students real-world experiences beyond what we are able to teach in the classroom," Schulz said.

By Jennifer Tidball